

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

EXPLOSIONS IN COLLIERIES, AND THEIR PREVENTION.

It is admitted that as yet but little progress has been made in the solution of that most important problem, how to prevent explosions in our coal mines. Indeed, it appears that as the working of coal fields is extended the liability to accidents from accumulations of gas increases in the same proportion. With the view of inventing so powerful and subtle an opponent to the development of our most valuable minerals parliamentary committees have been appointed, and the leading mining engineers have examined all their knowledge, various improvements with regard to ventilation have been suggested and adopted, whilst instruments of most sensitive nature have been invented for detecting the presence of gas, and warning the collier of danger. Still, with all that has been done, nothing that is really beneficial or practical has been achieved, for we find that fatalities from accumulations and explosions of gas have of late years been more numerous than they were before.

Parliament, on the Report of a Committee of the House of Commons, some years since, thought that in appointing a dozen Inspectors of Mines, as they are termed, a most important advance had been made in giving increased safety to the collier. Experience, however, has shown that the results have in no way justified the expectations formed, for the term "Inspector" is to all intents a misnomer, seeing that those gentlemen who fill the office cannot inspect a tithe of the mines in their districts, so that no small part of their duties consists in inspecting mines after accidents have taken place, and in sending inquests.

The efforts of our mining engineers and scientific men having thus failed to effect any material improvement by which accidents from explosions in mines have been rendered less frequent or fatal, the proposal made by Mr. Hermon, M.P., to give a series of prizes for the best essays, to be competed for by working colliers in Lancashire and Yorkshire, on the prevention of explosions in collieries comes most *apropos*, and we have every reason to believe that the results of the competition will be in the highest degree satisfactory, to the credit of a body generally looked upon less favourably from the ordinary intellectual standard than any other class of working men. We are also rather sanguine that we shall find in some of the essays matter practical and pertinent to the subject, and that, almost for the first time in our mining history, the working collier will be no unimportant contributor to our knowledge as to the best means of averting those fearful catastrophes in our coal mines with which the public have of late been made so painfully familiar.

It is said by many of the leaders of the working collier that a man should not be allowed to work in any place where naked lights could be safely used, on the ground that the atmosphere which renders safety-lamps an imperative necessity must be in the highest degree prejudicial to health, leaving out of view the question of danger altogether. This to some extent may be true, but if adopted under existing circumstances would lead to a complete stoppage of trade. Each being the case, we must look for some other means of mitigation, if we cannot altogether prevent, an evil of such magnitude as that resulting from accumulations of gas in coal pits; and seeing that all previous methods suggested for such a purpose have proved futile, Mr. Hermon appears to have adopted the only mode left open for applying to those whose opinions have not hitherto been asked on a subject which, to more than any other body, is of vital importance to them. Whatever the opinions of those who, as working colliers, may write on such an important subject, they will at least be received with respect, and adopted if found capable of practical application.

We reiterate that it is quite true that colliery explosions are now far more numerous and disastrous than they were some 30 or 40 years ago, or before safety-lamps were introduced. This was owing to the former mode of working, when the places where the coal had been got were swept by a strong current of air passing through them, every part of the mine being well ventilated. But to effect that object it was necessary to leave standing great pillars of coal to the extent of 50 per cent, or more, of the whole of the coal. The introduction of the safety-lamp, however, led to a great change, nearly the whole of the coal previously left as pillars being obtained. The consequence is that in getting all the coal the gas accumulates to a dangerous extent in the goaves, and too often leads to an explosion. The draining of those goaves of the gas, or ventilating them, has during the last two or three years received considerable attention at the hands of some of our most eminent mining engineers, and various measures have been suggested for the purpose by persons whose theories did not stand the test of practical application. Nothing of any consequence, we believe, has yet been done in the direction of clearing the goaves, and it is to be hoped that those who write the essays for the prizes of Mr. Hermon will not overlook so important a matter, seeing it is one they must be well acquainted with. That it is of the very greatest importance is admitted by all persons engaged in mining operations, and no less an authority than Mr. Embleton, the President of the Midland Institute of Mining Engineers, speaking of it, said:—

"Could not some plan be adopted by means of which the goaves could be entirely, or in part, ventilated? Here is the source of the greatest danger. However well the system of ventilation is laid out, if gas is to be found in the goaves the work is incomplete and imperfect. The material for an explosion is at hand, only awaiting some disturbance of the roof to discharge itself into the air-course, when meeting with an open light, or perhaps an imperfect lamp, it explodes, carrying destruction everywhere. How much better would it be to study how the gas can be removed, rather than be content to know that it exists, never thinking that it may at any time be the cause of loss both of life and property."

The views quoted above cannot fail to command the attention of those connected with mines, and it is to be hoped that they will lead to the adoption of some measure by which danger from gas in goaves will be removed. What are termed "outbursts of gas," either from the roof or floor, have long engaged the attention of those connected with mining work, and the question has been frequently discussed as to whether there are any means by which they can be prevented. It has been suggested, by one of the leading members of the South Yorkshire Miners' Association, that by boring along those parts of the floor of a pit where the gas might naturally be expected to ooze out, its earliest escape might be ensured. An eminent authority in

noticing the matter says that there is ample scope for enquiring into the causes of these eruptions of gas, "ascertaining the circumstances attending them, and deducing therefrom some mode of anticipating their effects, and it may be of obviating altogether their excessive discharge."

Blasting with gunpowder is another fertile source of destruction, and in Lancashire, Yorkshire, and Wales has led to very serious and fatal explosions. With regard to that means of bringing down the coal, there is every reason to believe that powder has not been used with that caution which its dangerous character requires, nor in the scientific manner which might easily be adopted. All our mining engineers are agreed that those engaged in superintending the blasting of coal should be well acquainted with the strength and tenacity of that mineral, as well as with the lines of resistance, so that no more power should be used than was actually necessary, and thus avoid reckless and dangerous waste. But were blasting done away with altogether, as it has been in many mines where gas is known to exist in large quantities, a great danger would be removed. We are thus led to notice the safety-lamp. With a "Geordie" lamp in his hand, many a collier considers himself fully armed against any and every danger. Experiments of late years have, however, shown that some of the best lamps have exhibited a facility and quickness in passing the flame through the gauze that, if the tests made are at all reliable, the lamps placed in the hands of colliers might turn out to be vehicles capable of "communicating flame to a surrounding fiery atmosphere."

It will thus be seen, from what we have stated, that with regard to our present knowledge as to the best means of averting colliery explosions there is a very extensive field open for investigation, and it is to be hoped that the liberality of Mr. Hermon will be the means of bringing to light some mode of working in coal mines that will lessen the liability of the miner to the most disastrous of all accidents to which he has hitherto been liable.

In the meantime much can be done to make the working places in collieries much safer than they now are. In that direction the views of Mr. Warburton, of the West Yorkshire Colliery, near Normanton, are worthy of serious consideration. He says that—

"Every collier examines his working place before he begins work, and receives his impression of the condition of it then, which impression remains with him during the day, and he toils on unconscious of the alteration that may be made by his operations. The only remedy appears to be by increasing the number of officers in the workings, so that each working place may be visited several times during the working hours, and thus be able to get a fresh impression of the actual condition on each visit, and to act accordingly."

Much, then, remains to be done, and those who can give greater safety, and a healthier atmosphere for the collier to work in than he at present has, will indeed be public benefactors. It is, therefore, to be hoped that the time is now at hand when such improvements will be made in mining operations that accidents of a really preventable description will be nearly unknown, and when will be realised the remark of Mr. Alexander, one of the Government Inspectors, that "When the fatalities about a colliery are reduced to falls of coal and roof I believe that the minimum of accidents under the system of working practised has been reached."

In common, then, with all persons connected with mining, as well as the general public, we look forward to the Prize Essays by working colliers with a firm belief that the views we have expressed will be ably and practically treated by those who attempt the task of showing how accidents by explosions of gas can be lessened, if not entirely prevented.

SOUTH WALES INSTITUTE OF ENGINEERS.

A special general meeting of the members of this Institute was held at the Temperance Hall, Merthyr Tydfil, on Wednesday, Jan. 24.

There were present—Mr. T. Dyne Steel, M. Inst. C.E. (Vice-President), in the chair; Mr. R. Bedlington, Aberdare; Mr. David Thomas, Rhymney; Mr. J. R. Waddle, Llanelly; Mr. J. M. Murtrie and Mr. Wm. G. M. Murtrie, Bath; Mr. M. Bates, Cyfarthfa; Mr. George Martin, Dowlais; Mr. M. Truran, Dowlais; Mr. Cope Pearce, Cyfarthfa; Mr. Edwin Richards, Chepstow; Mr. C. J. N. Gray, Mountain Ash; Mr. Walter Bell, Merthyr Vale; Mr. H. V. Trump, Rhymney; Mr. H. A. Huxley, Newport; Mr. Bedlington, Kirkhouse, Cyfarthfa; Mr. T. J. Price, Bridgend; Mr. George James, Risca; Mr. C. James, London; Mr. Hunt, Huxham, secretary; and other gentlemen.

The following rule, to be substituted for Rule 31 of the Institute regulations, was formally passed:—

"RULE 31.—Applications for admission of a candidate as member, associate, or graduate shall be made on a printed form, to be supplied by the secretary, which shall be signed by the candidate for admission, and also by three members recommending him, whereupon the applicant shall be balloted for in such manner as the council shall from time to time direct, and he shall be elected if the majority of the recorded votes be in his favour."

The meeting then resolved itself into the ordinary annual general meeting of the Institute.

The CHAIRMAN regretted the absence of the President (Mr. Wm. Thos. Lewis, M. Inst. C.E.) and numerous other gentlemen, who were that day engaged at a meeting preliminary to the opening of the great arbitration question of the wages paid at the Steam Coal Collieries of South Wales on Jan. 29, and that it, consequently, devolved upon him, as Vice-President, to take the chair that day.

The following gentlemen were balloted for, and elected as members of the Institute:—Mr. Theophilus Criswick, Swansea; Mr. Thomas Jenkins, Neath; and Mr. John Jones, Dowlais.

The CHAIRMAN formally admitted the following members, elected at the previous meeting:—Mr. Thomas Price, Bridgend; Mr. W. G. M. Murtrie, Bath; Mr. Walter Bell, Merthyr Vale; Mr. George James, Risca.

The SECRETARY laid before the members the annual statement of the affairs of the Institute for the session 1870-71, ending Oct. 29 last, from which it appears that the Institute, established in 1857, is in a most prosperous condition, consisting of 184 members, and possessing a credit balance of about 1000*l*.

The office-bearers for the session 1871-72, to replace those going out of office, were then balloted for, and the following gentlemen declared duly elected:—President, Mr. T. Dyne Steel, M. Inst. C.E.; Vice-Presidents, Mr. Thomas Joseph and Mr. David Thomas; councillors, Mr. M. Truran, Mr. B. Kirkhouse, Mr. David Joseph, Mr. David Davis, Mr. H. W. Lewis, Mr. R. W. Laybourne; secretary, Mr. Hunt, Huxham.

In consequence of the absence of Mr. Thomas Joseph, the discus-

sion on his two papers of "The Changing Character of Coal from Bituminous to Anthracite," and "Colliery Explosions in the South Wales Coal Field," was adjourned until the next meeting.

WIRE-TRAMWAYS.

The discussion of Mr. H. W. PENDRED's paper on "Wire-Tramways," adjourned at the last meeting, was resumed.

The CHAIRMAN said this subject had been very ably and fully treated by Mr. Pendred in his paper, and illustrated by numerous drawings, which indicated in a marked degree the advantages of this system, particularly in the transport of large quantities of material over districts ill adapted for the formation of tramroads, or in foreign lands where labour is scarce, and the country in a state of nature. It is working successfully in several parts of this country, where these advantages are fully experienced.

Mr. HUXHAM said that since the last meeting of the Institute he had taken the opportunity of seeing Mr. Pendred, to ascertain if any marked improvement had been effected in the application of the wire-tramway system. He found that a valuable addition had been made to the working powers of the system by the invention of a very simple attachment to the "box-head," that prevented it slipping on the rope whilst going up hill, thus enabling the wire-tramway to be worked at gradients altogether impracticable before this improvement. It consists of two small horizontal eccentric clamps, which are placed one on each side of the rope, within the V groove of the box-head, in such a way that any back movement or slipping of the box-head on the rope causes the eccentrics to grasp or bite the rope, and thus keep the box-head from slipping. The result is that the load can now be made to travel on the wire-tramway over steep gradients, which was impracticable before this improvement.

Mr. G. MARTIN enquired what was the greatest height of post that had been used for supporting the line? He knew the wire-tramway was working very successfully in Somersetshire, and he thought it well adapted for conveying ores and other produce over a rough district, where tramroads could not be laid down.

Mr. HUXHAM said that he believed posts as high as from 90 ft. to 100 ft. had been used. He thought it was a matter that only required a little ingenuity on the part of the engineer constructing the line; he saw no practical difficulty in using posts or supports for the rope, if properly constructed, up to 120 or 140 ft. in height.

The CHAIRMAN said the improvement described by Mr. Huxham was of great value, not only because the question of gradient bears considerably on the cost of working, but also because the invention would enable the wire-tramway to be used over gradients inaccessible to locomotive tramroads.

Mr. BEDDLINGTON said he saw the wire-tramway working at the last Exhibition, and it seemed to work well, according to the weights carried. He would like to know the heaviest weights that have in practice been carried, and also the cost of transport per ton per mile.

Mr. HUXHAM said the weights carried, in separate loads along the rope, varied from 1 cwt. up to 6 cwt., and he believed the cost of transit, including all charges for engine-power, labour, materials, and interest on capital, varied from 2*d*. to 1*d*. per ton per mile, according to the length and power of the line, and amount of work it had to perform.

Mr. J. M. MURTRIE thought the cost would, to some extent, be governed by the gradient and weight carried, for it was evidently cheaper to convey the ore or other material down hill than to take it up against the gradient.

Mr. E. RICHARDS thought it would be very desirable to obtain some definite information from Mr. Pendred, embodying the latest results and details of working cost on some of the lines now at work; and he would also ask Mr. Pendred to supply information as to what the wire-tramways are doing in England, how long some of them have been working, what produce they are carrying, how long the rope lasts, &c. Perhaps by the next meeting Mr. Pendred would be able to supply this information, and be present himself; with this view he moved that the discussion be adjourned.

Mr. DAVID THOMAS agreed with Mr. Richards's remarks. They should have the detailed results of recent actual operations before them, as it was to a great extent a question of comparative cost. He should be glad to see the discussion adjourned to the next meeting.

LACKAWANNA COAL REGION.

The next paper for discussion was that on the "Lackawanna Coal Region," by Mr. R. EVANS.

Mr. M. MURTRIE said the writer stated that in working these beds of coal it was found that the gas did not cause the floor of the mine to heave up, as it did in the collieries of South Wales. He thought the upheaving of the floor in the South Wales Collieries was to be attributed to the weight of the superincumbent strata pressing the pillars into the floor, and causing it to heave up. He thought the cause came from above, and not from the action of the gas below. He was quite aware that two or three cases had been brought before the notice of the Midland Institute of Mining Engineers, where violent issues of gas had taken place in the floor of the mine, but he thought that the reason of there being no upheaving of the floor in working the Lackawanna coal beds was attributable to the shallow depth of the workings, and consequent absence of any great superincumbent weight of strata, rather than the non-presence of gas in the floor.

Mr. HUXHAM thought the description of this coal-field had some bearing upon the paper of Mr. Joseph, "On the Changing Character of Coal from Bituminous to Anthracite," now before the Institute, as it was important to notice that, although the carboniferous or mountain limestone was wanting, yet the coal measures were described as lying conformably on the conglomerate, or millstone grit, resting directly on the Old Red Sandstone. It does not show the immediate proximity of the earlier primary rocks, as in many anthracite districts, but bears a close alliance to the conditions of the anthracite portion of the coal field of South Wales, with the exception of the missing member of the mountain limestone. The character of the seams appear to correspond very closely with those of the anthracite district of South Wales, and the quality of the coal is identical with the best anthracite worked here.

Mr. M. MURTRIE said that the Kilmarnock coal field was much interbedded and broken up by volcanic rocks, but in no case had the coal, which was of a bituminous quality, been converted into anthracite through the action of these rocks.

Mr. HUXHAM said that where trap or basalt rocks intruded into a coal field in the form of dykes, or even where they had partially over-

spread the coal measures, it is not found that the seams of coal are converted into anthracite; but in some parts of the Staffordshire coal field the action of the intrusive volcanic rocks is described as either charring the coal, or more frequently converting it into anthracite, where they had come in contact with it.

The discussion on this paper then closed.

The SECRETARY then read a paper by Mr. DAVID THOMAS, of Rhymney, "On the Avon Valley Mineral District." This paper, which is a very valuable addition to the series of papers illustrating and identifying the various portions of the South Wales coal field, now being brought before the Institute, gives a careful and well arranged description of a very important section of the coal basin, the result of many years experience and close study of its mineral characteristics; and was fully illustrated by carefully executed drawings and sections, on a large scale, which were exhibited on the walls.

A vote of thanks to Mr. David Thomas for his valuable paper was accorded unanimously.

A vote of thanks to the Chairman, closed the proceedings.

During the meeting Mr. EDWIN RICHARDS exhibited models and sample of Mr. Bond's (of Sirhowy Railway) patent keyless railway chair, a really simple and ingenious invention for perfectly securing the rail, without the aid of keys or suspension bolts; and by the adoption of which a very considerable saving is effected in the time and labour requisite to replace a rail at any time without disturbing the chairs.

Messrs. CHRISTOPHER JAMES and Co. exhibited samples of "Le-grand's Patent System of Wrought-Iron Sleepers," for colliery and general use, which are stated to be two-thirds cheaper than wooden sleepers, over a lengthened period. Each sleeper forms a combined chair and sleeper, made in one piece of wrought-iron, adapted for any gauge, and any description of rail. They are quickly laid, form a good road, and are very durable.

THE MINES REGULATION ACT—No. II. TO THE EDITOR OF THE MINING JOURNAL.

SIR,—You kindly permitted me last week to urge some reasons why the forthcoming Mines Regulation Act should differ considerably from its predecessor; not in detail only but in principle, so as to impose a real responsibility upon both the owners and managers of mines for the safety of those dependent upon their care. That I am not alone in this opinion is well known, and I now enclose a proof that the conviction is shared by some of those who have studied most deeply questions of social economy and policy, as is shown by the following memorial addressed to the Secretary of State by the National Association for the Promotion of Social Science:—

"Experience has shown that though by inspection under the Mines Inspection Act many important precautions have been introduced, and the observance of others rendered much more general, many are still neglected, whereby a large proportion of the thousand lives a year lost by mine accidents are destroyed, and far larger number of severe injuries not fatal caused."

The pecuniary loss and the misery occasioned by such very numerous deaths and injuries are so great and so wide spread as to be of important national concern.

The Council are of opinion that such misery would be much alleviated; and what is of far higher importance, the deaths and injuries that cause them would be (as in many analogous cases they have been) greatly diminished if compensation were secured to those injured, or to the families of those killed. In all cases of accident, though no injury could have been suffered if such precautions as are directed by law expressly to be observed by owners or managers of mines, or of others whom the employer has placed in authority over the person injured.

The Council also submit that this compensation should be due from whoever receives any profit from the mine.

They believe that the rules of law which debar servants from claiming compensation from their employers for injuries sustained by the wrongful act or default of fellow servants, or for such as are caused (in however small a degree) by the sufferer's own negligence, even though no injury could have been suffered had the employer not neglected, or allowed to be neglected, some precaution essential to safety, act with great injustice in many cases, but in few so glaringly as in mine accidents, against many of which the sufferers can guard themselves but very slightly, while their employers might observe and enforce the observance of very effectual precautions.

In the granting of compensation, it is desirable that the judge shall have power to decide whether the amount so granted in case of an infant shall be paid at once, or shall be invested for benefit of such infant.

The negligence by which fatal injuries are inflicted is in very many cases, though culpable, not felonious, and should be punishable less severely than manslaughter. In many cases the most appropriate and most effectual punishment would be the suspension or withdrawal of the license which every mine manager or other officer, upon whose care the lives of others are dependent, should be required to hold.

Though it is very undesirable that official inspection should be increased to such a degree as to transfer to the Inspector the responsibility of the manager for the safety of the miners, it is very important that both Inspectors and managers should receive early information of any cause of danger, or even of apprehension. One of the most economical as well as effectual means of securing this would be to empower the Inspectors to pay one or more of the men working in every mine to examine it (say) one day a month, and point out to the Inspector and manager any practice or condition such examiner or his fellow-workmen may consider dangerous.

The Inspector should, if he consider any practice or condition of a mine unusually dangerous, call the attention of the manager, and if any person suffers personal injury, which he would not have suffered had the danger of such practice or condition been removed, the owner of such mine shall pay such compensation to the sufferer, or to his family if killed, not exceeding £1,000, as the Court shall award.

The law, instead of directing that such ventilation of the working places of mines shall be maintained by the owners as will, under ordinary circumstances, keep the air in a fit and safe state, should direct them not to allow their pitmen to get coal, or permit any blasting with powder to be done in any part of a mine whilst the air in any such part is dangerous, or, better still, whenever the proportion of fire-damp in it is nearly approaching the explosive point at one part in fourteen. If such a law were observed, though occasional and limited explosions might still occur, those destructive of many lives at once would become exceedingly rare."

There are here several distinct questions, which will be most conveniently treated distinctly. First, of *mine managers*. If it be decided, as I trust it will be, that managers ought to be responsible for the consequences of their carelessness resulting in injury to those whose safety depends upon their care, the question will be, What is the nature and amount of the responsibility to which it is just and expedient to render them liable, and also who ought to be considered to be managers of mines?

At present, unless a death be caused by such gross negligence as amounts to manslaughter those who have caused it escape punishment altogether. It would be neither just nor expedient to make convictions for manslaughter so much more easy as to include all cases of culpable homicide, for there are degrees of carelessness which, though culpable, are not felonious, and a man should not be declared a felon merely because he has undertaken a very difficult duty and not performed it perfectly. If, however, men's lives depend upon the due performance of the manager's duty, and if he fail in such due performance, though it might be wrong to punish him with severity for failing, it would be quite right to relieve him of a duty he has shown he cannot properly perform; and this might be done—first, by requiring that all who undertake such duty shall offer satisfactory proof that they know what precautions are necessary for safety, and obtain a certificate of competency; and, secondly, that if they neglect such precautions, or allow them to be neglected, the certificate of competency shall be suspended or withdrawn.

Perhaps the best proof a man can give of his ability to do anything is the fact that he has done it; anyone, therefore, who has managed a mine with success, and has done so without accident fairly attributable to his want of care or skill, should be entitled to a certificate without examination, all certificates being revocable upon proof of culpable carelessness or incapacity. Whenever an accident involving death or injury shall occur at any mine the Secretary of State should be empowered to direct, if he think fit, an enquiry by a stipendiary magistrate or county court judge, aided by two disinterested mining engineers, to ascertain and report to him if the accident could have happened if any precaution which the manager ought to have observed had not been neglected; and if it shall be shown that the precaution neglected was one which the manager ought to have observed or enforced his certificate of competency be suspended or withdrawn.

Among managers of mines should be included agents, viewers, captains, or others by whatever title distinguished, who are deputed by the owners to give directions on their own authority. It will have to be enacted that in every mine one manager, at least, should be certificated, and that anyone not so certificated, or whose certificate is suspended, giving orders unless by the express authority of one who is certificated, shall be liable to a penalty for every day in which he

so acts. The effect of such an enactment would be to very quickly free miners from the incompetent and careless men by whom disgrace is brought upon the whole body; to compel all mine owners to do what all wise and just owners do without compulsion; to carefully select for this most responsible office those only who are really competent, and to induce them to employ those who have acquired a reputation for carefulness, even though they may not be the severest taskmasters. It now not unfrequently happens that mine managers get unjustly blamed for the faults of others. If careful enquiry were always made by those competent to judge it would in such cases be frequently shown where the blame really rests, whereby the reputation of innocent men may be saved, while in all cases the great good will be gained of ascertaining the real causes of disaster, for future guidance and warning.

But though requiring all mine managers to procure certificates of competency, and more especially the liability to loss of such certificates from proved incompetence, would do very much to secure improved management, a far greater security for it would be given if it were made the direct and immediate interest of all mine owners that all danger should be as much as possible reduced. Mine owners are, of course, neither much better nor much worse than other men, and it is absurd to suppose that they do not anxiously desire to diminish their men's danger; but mines are not worked for philanthropy but for profit, and if they cannot be worked with profit they cannot be worked at all. It follows, therefore, that as all coal, whether got with much or little danger, has to be sold (if of the same quality) at the same price in the same market, that no mine owner can afford to incur costly precautions which his rivals in the trade avoid, and, therefore, there is a constantly acting temptation to be saving, perhaps parsimonious, in the cost for precautions for saving the men from danger, unless such precautions do also, as they often do, diminish risk to property. It is time that many mine owners do take the necessary precautions voluntarily, and that to a very considerable extent all observe those they are liable to penalty for not observing. But to this there are very many exceptions, and hardly a day passes without one life at least—often more than one—being lost, which would not be lost were the precautions directed by law universally observed.

The change here needed is evident. It is that whenever it is decided by the above-named enquiry that bodily injury had been sustained which would not have been suffered if some precaution directed by express law to be observed by the miner had not been neglected, that the sufferer, or his family if killed, should be entitled to just compensation if, though he may in some degree have contributed to cause the accident, it be shown that the accident could not have happened had the owner not neglected his duty as expressly directed by law.

The effect of such a change of law would be great and immediate. It would be highly beneficial to all those owners who do carefully and properly observe the precautions directed, for they would be protected as they ought to be from the unjust competition of their rivals, who seek to undersell them by avoiding costs that cannot be avoided with humanity or even honesty. Those only who neglect their clearly just and legal obligation of observing precautions Parliament has decided to be essential to safety would be in danger of loss, and that risk they might avoid by the simple expedient of a faithful obedience to the laws, while if there be any increase of cost, which would not be repaid by increased facilities in obtaining good workmen, without the cost of bribing them to brave needless danger, would be repaid by a slight, I believe imperceptible increase in the cost of coal, which would be an increase of profit to those who obey, a loss only to those who neglect, the law.

A very similar danger has been greatly removed by a very similar treatment to that proposed. Forty years ago maiming accidents by not fencing machinery were very common, which now, though the numbers employed in factories are vastly greater, have become far more rare. Amongst other excellent provisions of the Factory Act is one directing that all factory gearing shall be fenced, and another directs that if anyone shall suffer personal injury in consequence of factory gearing being left unprotected the owner shall, on summary conviction, be liable to a heavy penalty, the whole or part of which may be paid to the sufferer. Now, I am informed, that though there have been very few convictions under this Act, it is constantly in powerful operation, the liability to the penalty, which is largely greater than the cost of fencing off the gearing, prevents that necessary precaution being neglected.

Now, why should we not adopt this principle to mines? What is sauce for the goose is sauce for the gander. If factory owners have been induced by being rendered liable to a large compensatory penalty for neglecting a specified precaution when injury follows their neglect, can it be doubted that mine owners would be induced by similar motives to act in a like manner? At any rate, the plan should be tried. If it fail, it will not fail, to prevent many a fatal accident, it will at least secure the families of the sufferers from destitution or pauperism. If it does not save life it will diminish misery; but it will do both, if it be true that like causes produce like effects, as no one doubts.

DESTRUCTION OF FIRE-DAMP.

SIR,—With reference to the competition for the very handsome premiums offered by Mr. Hermon for the best suggestion calculated to prevent explosions in coal mines, I would remind competitors of a very excellent proposition that has several times been made to destroy the fire-damp altogether. In looking carefully through the statistics of accidents in collieries, I notice that all the great explosions have occurred in mines from which large quantities of coal are annually raised, whence I conclude that the workings are necessarily extensive. Now, every man of business must know that it would be quite impracticable to do more in any of the larger collieries than improve the present system of ventilation, as to attempt any radical change would be attended with more danger than would result from leaving the pit without improvement. For example, where a colliery is being worked to the rise it might be practicable to run a heading to the extreme rise of the take to communicate with a shaft there sunk, in order to drain off the gases thereafter escaping, or which may have accumulated in the goaves; but the making of this change would be attended with much danger, unless the pit were laid idle while the alteration was effected.

There would naturally be an immense quantity of gas to pass through the new shaft when made, and there would be much difficulty in putting the goaves into connection with the new shaft while the workings remained in connection with the old shaft; and it would scarcely be convenient to have a large undrained goaf between the workings and the upcast shaft; yet this would be unavoidable if the old upcast on the dip were shut up at once. In opening new mines it would, no doubt, be practicable to lay out the workings so as to accord with any really useful suggestion that might be made; but, unfortunately, nearly all our collieries are already extensively opened, so that the system of working is no longer a matter of choice. Under these circumstances, I think we must anticipate the largest amount of safety from some proposition for destroying the fire-damp altogether.

During the last 20 years many propositions for destroying fire-damp have been referred to in the *Mining Journal*, and the experiments reported with some of them were, I think, moderately successful; but I do not recollect that any of the inventions were practically applied on a large scale. But as chemistry has now made such great strides it is likely that any difficulty that was met with 20 years ago could now be surmounted. The nature of carburetted hydrogen is now so well understood that surely some of our great chemists could explain a method of decomposing it cheaply and thoroughly, and thus freeing the mine from danger. I myself saw a safety-damp used, which consisted of a pair of wire-screens with some chemical composition (which I was not allowed to examine) between them, and when this door had been for a couple of minutes in front of a small chamber filled with fire-damp, the chamber could be entered with perfect safety, all the gas having been absorbed by the material in the screen. Now if the nature of this material is known why could it not be generally used in collieries, especially if experience should prove the accuracy of the inventor's claim that the material used lost very little of its power in decomposing the fire-damp, and could readily be revived when exhausted. I believe the name of the in-

ventor was Le Mat, or else Wall, but as both gentlemen have been destroying processes, I do not recollect the difference between the two inventions.

WITH WHAT ARE THE STRATA ABOUT PROPOSED COPPER LODES MINERALISED?

SIR,—In continuing my remarks on this subject, and in view of what I have previously said, I shall begin by stating a chemical analysis of the strata may serve to denote the nature of the lodes situated therein might contain, but I very much doubt if it would be any reliable criterion as to the quantity of copper ore, as supposed clay-slate, a rock every way favourable to the formation of copper ores, was found by analysis to contain, in its usual ingredients (alumina, silica, and iron), lead, copper, silver, and sulphur, it would be a fair presumption to suppose that gray ore of copper should be found in the lode, as composed of several ingredients of which that class of ore is composed could not be regarded as anything more than an ordinary rock by which to judge, and as such only augment by the addition of the favourable features and indications already known to be successful in their relation to metalliferous deposits, and as such a strata "proved by analysis," and a lode situated therein, in relation to which such analysis had been made, was found to contain an abundant yield of the gray ore of copper, accompanied by a favourable internal indication of its continuance, what an unfavourable analysis of the strata weigh against such a conclusion. I am of the opinion it would be at once concluded that the lode was fed from other sources and through other channels, in connection with such manifestations, the existence and extent of every person of reflection and experience, and such agencies with effects which were visible, but otherwise unaccountable, in their origin or producing cause. It is almost needless to say this is one of the class of proofs, or conclusions, deduced from a *posteriori*, and as such is always admissible in connection with mineralogy and geology, and not only so, but the process by which remote causes are traced and connected with visible effects, and thus truths otherwise unattainable are made manifest.

But if further evidence were required in support of this conclusion, have only to turn our attention to the metalliferous deposits in the igneous rocks, and acquaint ourselves with the conditions which they must have been conveyed to the respective strata, which we now find them. The granites and trachytes, and other life rocks in their field of metallic minerals, will amply support our present purpose. Both these classes of rocks are highly line in their structure, in fact, they consist of an aggregate of ferent crystals in variable proportions, and may be rendered impervious to water, without undergoing decomposition. The attractive cohesion, and may be easily separated from each other by mechanical means. They differ from the porphyries in being highly crystalline, and in their not inhering, like them, in a visible support or band to their aggregation, but are, as stated, held together by the force of attraction. This is a curious force, as is evidenced by the hardness of both these rocks in their primary condition, but one which, it is well known, at invariable distances, therefore the power which suffices for the rejection of water between these crystals suffices also to support them beyond the range at which this force can possibly act, Turkey water itself, at the same time, interposes a barrier to its bounds, and becomes the decomposing agent of such rocks, which, in this stage set in, proceeds with greater or less rapidity, depending on the quantity of water intervening, and the pressure under the quartz. It is well-known that metallic minerals found in the European do not depend on and did not proceed from the decomposition of the rocks themselves, as it is frequently the case that the most rich deposits are found in those rocks when unaltered in position, and, therefore, must be considered as wholly independent of any such conditions. If such rocks, then, cannot be the vehicle of water, except at the joints, without undergoing decomposition, and, at the same time, it is found that when unaltered in position, the elements they are most prolific in their yield of metallic minerals, it must follow as a necessary consequence that the source of the source of the metalliferous deposits which are found in the strata, but that some other source and channel of their origin must be sought for, and where shall we look for these but to the elvan courses, dykes, &c., to which an importance scarcely less than that of the lodes themselves must be ascribed.

Returning for a moment to the composition of the strata, as a necessary condition of the quality of the lodes contained in them, it recurred to me that their structure—the relative position of their cleavage to the strike and dip of the lodes—was no less important, and one which cannot be overlooked in any enquiry. It does not seem reasonable to suppose that lodes, with the strata, and parallel with the line of cleavage, are sibly yielded as exuberantly and continuously in depth as those the dip of the strata was obliquely opposed, except it should be in respect of the former that the lines of stratification were by longitudinally parallel, but highly inclined, or some vertical courses, which, when effecting the dislocation of the strata, termed "faults." This may be regarded as a compensatory provision of nature, and unless it exists lodes found in a strata—dipping conformably with themselves—are not considerably wider for permanent mining. In the latter case—that of obliquely and the line of the stratification and the plane of its cleavage—by the lode both longitudinally and in depth, the causes are different. The natural structure of the rocks and lodes conduces to a minimum of communication and reception—independently of more favourable conditions, the strata discharging the burden of the percolation of ore into the adjacent fissures, which are in every way adapted for reception; and this, too, by a natural and rationally sphere are process—that of specific gravity, by which the natural heavy bodies are to descend and displace the lighter ones, supply a doubt, by the attraction of affinity, or aggregations, and the effect of the waters themselves, which we conceive never to be deficient, in the rock-structure of our globe. And this leads us to notice a fact, though in connection with this subject, and one which may be obvious not to mould, to modify and regulate our opinions regarding the effect of individual stratum on metalliferous deposits. What is it? The direction of the aqueous currents through the rocks, persons the lodes are contained. The directions of the electrical currents through our mines, where the experiment has been made, have been ascertained, and probably that of the subterranean water, which might be, and that without any scientific process of investigation, simply by observations of natural facts, and some idea of the even-ble effect of the inflowing waters on the lodes be anticipated by their analysis.

The filling of fissures by the agency of water presupposes, as well as an inlet for the same; and as all lodes are unquestionably furnished with their mineral and metallic contents by the difference, when ascertained, in the substances held in solution by the outgoing and the incoming waters to the lodes, we are one to determine, with comparative accuracy, their effect on the lodes. But even then the condition of the lodes themselves must be taken into for evidence of their own growth and advancement, and the return, and *vice versa*. Yet, not so strongly in the latter case, the former, inasmuch as if the waters going out of a lode were to be more heavily charged with metallic substances than those that went into it, it would be strong presumptive evidence of the lode's decomposition, and if, at the same time, the lode exhibited internal evidence of decomposition, as it always does when sufficiently advanced in its evidence, added to the former, would be conclusive that the lode's meridian—the perfection of its nature—was being gradually resolved again into its primitive elements, to be borne by the agency from, as they had previously been into, the lode, and contained them—to enter into new combinations, and be associated with a new order of things. It is, therefore, clear that the quality of the strata, *per se*, or its lack of quality, is a factor in the process.

other hand, are not of themselves sufficient evidence from which to determine the productiveness, or otherwise, of the lodes contained therein, but that other conditions must be had recourse to and consulted as essential or primary conditions of the effect which may be produced from the quality or composition of the strata on the lodes themselves, and that these are sometimes found in the lodes themselves, and at others elsewhere—not unfrequently remote from the immediately contiguous rocks in which the lodes lie embedded.

Ellsworth, Nye County, Nevada, Dec. 20.

R. KNAPP.

THE MINING FIELDS OF THE FUTURE.

SIR.—The amazing consumption of minerals and metals is causing many to wonder whether the resources of these useful and essential commodities will run short. I beg, therefore, to address to you this communication in elucidation of the question.

There is a great deal of croaking as to the whereabouts, if anywhere, of our metal supplies, and those of our chief minerals. The exhaustion of our coal fields is now a theme of fashion. In Nottinghamshire and Shropshire, in positions where none was expected to be obtained, fine fields were opened up; and in Yorkshire and Lancashire, where it was hoped to find it, the hopes have been realised. In Scotland old mines have been re-opened and new ones discovered. There is a large area of brown coal in the Highlands, very similar to that so extensively existing in Muscovy, but in neither place has it as yet been turned to any beneficial account, at all events for purposes beyond mere fuel for the poor.

Ireland could supply the United Kingdom with anthracite for hundreds of years, and has a good store for a long time of household, or, as the Scotch curiously call it, house-burning coal for herself. If the day ever arrives when the people will catch the fish on their shores, compress the peat in their bogs, dig up the coal, iron ore, cupriferos ores, argentine treasures, and will cultivate a notoriously fertile soil in at least a rational manner, carrying coals to Ireland will be about as much an aphorism and a pun as "carrying coals to Newcastle" is now.

France has coal for sea purposes, and need not import from Wales, at she does not like mining, and Frenchmen make "precious bad" miners. But coal is plentifully strewn throughout her subterranean territory. It is to be found in the east in India, Sattara in the Archipelago, China, and Japan. It is lurking in the Antipodes waiting to be brought to light and to give light, and it challenges industrious search over a large area of the western hemisphere.

Next to coal, iron is the great good of man. There was a time when he used stone arrows, flint hatchets, copper swords, and copper and stone hammers, &c., not because the iron was not beneath his feet, but because he did not know how to get it. Now he does know, and knows how to marry the coal and iron together, and bring forth the fluid metal, or the wrought, ductile, yet stern iron, the flexible and penetrating steel. Where is he to get it. England going all over Europe begging for iron ore, as the mines of Great Britain do not produce enough for her furnaces. Spain has helped her; Ireland could give us iron to any conceivable amount. Centuries ago it was her chief industry smelted with charcoal, as is now the case in Russia, and as there also, notwithstanding the presence of coal, whenever the iron was wrought. In Russia every kind of iron ore exists—from the Caspian Sea to the Ural Mountains, from the north to the south of European Russia. Turkey in Europe and Turkey in Asia are rich in iron. In the Western Hemisphere it is not bounds, especially along the Pacific side of the Rocky Mountains, which, in the case of coal, so also of iron, the Great Providential storekeeper of man's future supplies has over the world's area piled it up.

The question is often asked, Where is tin hereafter to come from? In Europe there are no known supplies but those of Cornwall. Specks have been found in Wicklow and in Kerry in Ireland; lately in Portugal, and on both sides of the Alps. But, on the whole, there is no prospect of a European supply, continental or insular, but what the grand old western English county can yield.

Some tin has been seen in very small particles in the Himalayas in the Andes—thus far apart, and along the Cordilleras and Rocky Mountains tin stones have been picked up, but no mines have been indicated anywhere but in the Eastern Archipelago in the colonies of the Dutch, and from whence, or from Holland rather, we import it. The most likely place to find new veins of tin is Burmah, near British Burmah, and on the Chinese territory not far from where it touches the British and Burmese boundaries.

It is at present probable that many old men amongst us may live to see the day when Cornish tin will fetch even double, possibly triple, its present prices, as the tin of the Straits is very rapidly coming, and no fresh discoveries give promise of increased supply. There is undoubtedly a good time coming for Cornish miners, and for sellers. A mine of tin in Cornwall will be by-and-by more profitable than an ordinary mine of silver in Bolivia or Peru.

I purpose, with your permission, next week to continue the subject, and, therefore, will not now further trespass on your space.

Gresham House, City, Jan. 31.

THOMAS SPARGO.

"WHAT TO SELECT—WHAT TO AVOID"—No. X.

SIR.—From the numerous letters I am continually receiving upon the subject of mining investments, it is clear that a misconception prevails among investors in regard to the marketable value of mining property. Some would appear to be unaware of the fact that in a properly worked mine the reserves of ore are increased proportionately with the scale of development, by which the returns are regulated and the dividends equalised.

By others it would seem to be regarded that the amount of the current dividend should be the basis of calculation as to the value of a mine share, than which nothing can be more illusory. Mines are not mere annuities, whose value is determined by the amount of ore discovered, and the prospective value of the undeveloped ground, rather than by the mere amount of dividend declared. But there are other causes, entirely independent of these considerations, which regulate the value of a mine share—the inevitable law of supply and demand often has a much greater advantageous or adverse effect than even a discovery or a falling off in the mine itself.

Hence, the actual price of a share upon a given day cannot always be accepted as a criterion of its real commercial value, for the very obvious reason that it may have been temporarily affected by exceptional causes; for instance, what is known as a "weak bull account"—that is, an account comprising large purchases made on behalf of persons who on the settling day are unwilling to pay for that which they have purchased—will occasion an active demand during the preceding fortnight, but a sudden relapse follows on the settling day; whereas, on the contrary, what is known as a "heavy bear account" will depress the price until the settling day arrives, when, in the event of stock not being forthcoming, a rapid rebound in price ensues. These operations often occur and recur, irrespectively altogether of any change in the mines, and are facts which the bona fide investor should watch and profit by, and never allow his opinion of a mine to be unduly influenced as to its future, simply on account of an inflated or depressed market value. Therefore it is not only necessary to know "what to select, and what to avoid," but it is of equal importance to know when the selection shall be made.

It would be an invidious task to point out the many anomalies now existing in the mining market,—how one mine from prospects alone is selling for an aggregate market value of 125,000*l.*, without returning 1 ton of ore, while another returns 70 tons, and realising a fair profit, with splendid prospects as to its future, does not command a greater aggregate value than 48,000*l.*; how another mine is returning dividends at the rate of 13 per cent. upon the present price of the shares, and is selling for 56,000*l.*, while another is making a large monthly loss, yet commanding a market value of something like the same amount. These anomalous facts (and many others of a similar character might easily be added) deserve the close attention of those who would be successful in mining investments.

These remarks need scarcely be supplemented by the statement that it necessarily follows a mine is without merit because it has no marketable existence, although it must be admitted that a tangibly reasonable value is an appreciable advantage, increasing the worth of an investment. There are home mines totally unknown upon the market of real proved merit, but, alas! their name is legion that have neither merit nor marketable value, so that when the selection is being

made these points should be fully considered—the character of the mine, its producing powers, and its marketable status, as without the latter (however good the mine) its shares are clearly of less value.

EBERHARDT AND AURORA.—The financial position of this company is to be much regretted, as from information received from the district it would seem that the mines are opening out in a most satisfactory manner. At the North Aurora, in the south drift, running from the Lady's Chamber, an immense body of ore is reported to be in sight, and the size of the ore body increasing daily. It is reported to be the finest body of ore ever developed in the State. The foreman (this is not Mr. Philpotts) estimates the value of the ore in sight at \$250,000—that is to say, this amount of ore has been discovered since the mine was last reported on. The ore body is described as being without limit, neither an eastern or a western wall having been met with. It is reported that an improvement has taken place in the Eberhardt Mine. All I can add is, that although some people would have us believe that the White Pine Mines are worked out, there is before us the incontrovertible fact that during 1871 the White Pine Mines returned silver ore to the value of no less than \$2,500,000.

SOUTH AURORA.—The shareholders have acted wisely in accepting the offer of the vendors to refund 40,000*l.*, and to hand over to the company the series of important mines known as the Chloride Flats. This will place the company in a sound financial condition, and provide ample working capital for the thorough development of the whole of the properties. Including the 40,000*l.* from the vendors, there would appear to be an available balance of 56,000*l.*, against which there is a liability of between 4000*l.* and 5000*l.*. The honourable course adopted by the vendors is without parallel in the history of joint-stock enterprise.

FRED. WM. MANSELL.

1, Pinner's-court, Old Broad-street, Feb. 1.

MINING ON THE RHINE.

SIR.—The answers from "Our Correspondent" to "Rhinelander" induce me to read over a few of the articles written by "Our Correspondent" on "Mining on the Rhine," and published in your most esteemed Journal, commencing with 1869 to the present date, and I think it will be amusing, as well as instructive, to many of your readers to do the same.

"Our Correspondent" must bear in mind that the promises held out by him to induce the public to speculate in his favourite mines have, thus far, fallen very short of being realised. He very well knows that serious disappointments have already taken place, and ought, therefore, to be a little more civil in his replies. In his last two articles he says a great deal about reports from Freiherr von Huene, Herr Dismar, and several others; but, before proceeding further, I beg to state that I have not read any reports signed by those gentlemen, and, therefore, do not wish to bring their names into the question. I only wish to refer to statements made by "Our Correspondent" in the *Mining Journal*, and as he says so much about facts I can assure him my desire is to be guided by the same.

In September, 1869, "Our Correspondent" writes:—"The St. Josephsberg Mine was, at the time of my last communication, idle, or nearly so, the only work then in progress being the deep shaft, which has been extended into the mountain over 500 fathoms, by means of which three lodes have been cut."

On which he says Capt. Richards reports:—"In the deep shaft, about 35 fms. north of Alexandra shaft, a lode has been cut, with a leader about 2 ft. wide, worth 8*l.* to 10*l.* per fathom. About 10 fms. further north a second parallel lode has been cut through, 3 ft. wide, which I value at 32*l.* per fathom. About 9 fms. still further north a third parallel lode has been driven through, composed of spar branches, mixed with ore and some kallas, a part of which may be worked at a profit—a promising lode." Adjoining this is a cauter. The lode is cut into 15 ft., and is worth about 2*l.* per fathom."

"Our Correspondent" then says:—"Since this report the lode has been found to be 22 ft. wide, all rich work, and 2 to 2½ ft. wide—will produce 35 to 40 per cent. of copper."

In the early part of 1870 "Our Correspondent" writes:—"The St. Josephsberg, the subject of my first letter, so long ago as May, 1867, has, in consequence of that communication, been set at work by a company with 30,000*l.* capital—all the shares well held, and is returning very large quantities of mineral, with the certainty, under good management, of immense dividends."

He then goes on to say:—"Its two drawing engines are at work, and a 60-in. cylinder engine is being erected, and will be ready for work by April 10, as well as the stone-breaker, crusher, and dressing apparatus. The acid reducing works are in full operation. The company need fear no fall in the price of metals, as a very large portion of the copper ore exceeds 25 per cent. produce, and the poorer ores, being carbonates and phosphates, can be returned at very large profits by the acid process, whilst the lead is rich for silver—a point too much overlooked by the investing public."

"Our Correspondent" does not in the above say anything about private property; but, in fact, tells the public that they should not too lightly overlook such matters—and yet, strange to say, because "Rhinelander" makes some enquiry he turns round and abuses him, and, stranger still, says the company is making no returns, but sinking a shaft to get under the rich courses of ore left in the bottom of the 85 fathom level. Well, then, might not any of your readers truly enquire what has become of these immense riches reported from the adit level about two years ago? From what "Our Correspondent" informed us about erecting the dressing machinery, the acid-reducing works, &c., we have reason to think that the company intended to make returns, which undoubtedly induced "Rhinelander" to make some enquiry.

I am a well-wisher to the St. Josephsberg Company, and all other mining companies. I only think, with "Rhinelander," that the statements put before the public by "Our Correspondent" are much too strong, and are liable to do legitimate mining and honest managers much more harm than good. For example, let us return to the Phoenix Mine. In 1870, "Our Correspondent" writes:—"Here the lead lode is immensely rich, worth 100*l.* per fathom. The blende is also rich, and the lode having been discovered on both sides of the two cross-courses which formerly appeared to bound it, no limit can be fixed as to its value. There are three steam-engines for pumping, hauling, and dressing, and in good repair. All that is here required is vigorous management."

May 4, in the same year, "Our Correspondent" again writes that the agent at the mine states that the leader of lead is 5 ft. wide, solid. "And I can," says "Our Correspondent," "positively assert from personal observation, that it is from 4 to 5 ft. wide."

"Taking, then, the average produce of the lode for the 23 fms. at only 24 tons per fathom, and you have backs laid open 10 fms. high, or 230 fms., producing, at 13*l.* per ton, 71,700*l.*

"By sinking the shaft and extending the levels a like quantity of ground may be laid open and taken away, giving a return from this part of the mine of 143,400*l.* worth of ore.

"There is also here a leader of blende, 3 ft. wide, worth 8*l.* per ton. This if itself at the shallow depth of 41 fms. would make a profitable mine."

"But, leaving the blende out of the question, and taking no credit for the lead to be raised from the parallel lode recently discovered, it may be fairly estimated that in the first year ore will be returned from the lode east of the cross-course—

To the value of £ 42,000
From between the cross-courses 143,400

Total £185,400
Monthly cost, 500*l.*; on these increased returns 9,600

Leaving net profit on the first year's working £175,800

This really reads very fine. Why, who could refuse to buy shares? "Our Correspondent," as above stated, says—"All that is here required is vigorous management."

Capt. Richards, a gentleman much extolled by "Our Correspondent," took the management, but failed to pay dividends, or even to make the mine pay its working expenses.

After Capt. Andrews two other gentlemen succeeded each other as managers, but no dividends. I think this enough to convince one that "Rhinelander" was not far wrong; and might not all those managers truly exclaim "Preserve me from 'Our Correspondent'?"

"Our Correspondent" now says—"The inadequate capital, and the delays and expenses of the late war, and not the poverty of the mine, were the causes of its suspension." He might also add that the mine has been working again since the war, but no dividends.

Allow me to inform "Our Correspondent" that numbers of mines in Prussia were carried on during the war, and continued to pay their proprietors dividends, which were not half so rich—nay, not a quarter as rich—as he represented Phoenix to be.

and 2 to 2½ ft. wide, which will produce 35 to 40 per cent. of copper—neither do I know any mine for sale or in operation which can be fairly estimated to pay profit on the first year's working of 175,800*l.*

I am a well-wisher to mining, and do not hesitate to say that I know of mines in Rhenish Prussia for sale, which I verily believe, if properly laid open, will pay very good profits on the capital required; but such immense riches as stated by "Our Correspondent" I have not yet seen.—Jan. 25.

A. BERGMANN.

"SCIENCE OF INVESTMENT."

SIR.—The circulation of the private and joint-stock banks of England and Wales for the four weeks ending the year 1871 amounted to 29,293,831*l.*; of this sum the Bank of England notes issued amounted to 24,278,216*l.*, leaving only a sum of 5,015,615*l.* of other notes in the hands of the public—private banks 2,678,928*l.*, and joint-stock banks 2,346,687*l.*. It will be thus seen that the vast commercial dealings of the country, so far as banking finance is concerned, is based almost wholly on bullion, for the Bank of England had in its vaults the sum of 24,777,888*l.* at the date of last week's return, and the average amount held for the four weeks ending Dec. 30, 1871, was 24,729,118*l.*, a sum exceeding the entire issue.

What are we to do with our money is a question that almost everyone asks of his friend or broker whenever they meet. The answer is a shrug of the shoulders, and I don't know what. Brother Johnathan, however, has decided for us; and, not content with the sums already exacted for rocky patches of inaccessible hills in Nevada and California, he continues to foist his schemes upon the English public with an avidity that expands with every instance of successful gulling. We have now before us the London and Californian Mining Company, "limited" to 330,000*l.*, of which the vendors exact 280,000*l.*, leaving 50,000*l.* for preliminary and contingent expenses, capital to work the mines, and a margin to cover the commissions that are allowed to brokers, and other charges, even should all the shares be issued. What liberality towards the public! Surely they ought to receive the scheme with open arms, for the agents at San Francisco positively state that "the amount at which the properties are offered could readily be obtained in California," whilst the prospectus asserts that the mines are worth the sum asked!

We heartily agree with the *Times*, that in the absence of explanation it seems strange under the circumstances that the American vendors should prefer taking the trouble to get the money from England. What would this 330,000*l.* do in Cornwall, in Wales, or even in Ireland? In Cornwall, South Caradon has yielded dividends of 345,344*l.*, on 670*l.* outlay; Dolcoath 386,500*l.*, on 46,182*l.*; Tincroft 205,000*l.*, on 54,000*l.*; Carn Brea 300,000*l.*, on 15,000*l.*; East Pool 79,800*l.*, on 3150*l.*; Botallack 120,750*l.*, on 18,250*l.*; Levant 140,000*l.*, on 400*l.*; whilst reference could be made to Par Consols, Fowey Consols, the Crinnises, Crofties, Roskens, Tolguses, the St. Ives Consols, and a host of mines that would compare equally favourably. In Wales we have the Van, Cwmystwith, Lisburne, Goginan, Llangynog, Minera, and many others that would compare favourably with the best of the Californian mines, at present so favourably and reasonably vended to the English public; whilst in Ireland all practical authorities concur in acknowledging her vast mineral wealth, which prejudice and misdirection of capital from home to foreign countries alone deter from being developed. These references to home and foreign mining are pregnant with matter for reflection to all who embark their money in speculative enterprises. There is a species of fascination in gold and silver seeking that permeates all classes of society, yet the student of the "Science of Investments" should remember that copper, tin, and lead are found in bulk in the Mother Country, whilst few in either California or Nevada find a "nugget" which does not cost its worth before attained.

The political hemisphere is somewhat overcharged. American demands will scarcely be entertained, far less complied with. Yet what is 200,000,000*l.* to settle all differences between the new and the Mother Country when English gullibility gives 100,000*l.*, 200,000*l.*, 300,000*l.*, and even 550,000*l.* for a few acres of waste and rocky land of no use whatever for agriculture, the sustenance of man or animal life, or any other practical purpose whatever? France has lost her backbone; the mainspring of her vitality is suspended for an age, the young and vigorous manhood has to a great extent disappeared in open warfare and domestic conflicts, hence France will have few securities to offer to draw English money. Had France mastered Germany a union with Italy would at once have set Europe in a ferment. The growl of the Northern autocrat has been heard in the Turkish divan, and happily for all interested in foreign Government bonds that France has had to succumb, or otherwise the dividends on bonds of Egypt, Turkey, and Italy would have vanished as smoke from a furnace. We, therefore, think that 10 per cent. interest received by investors in these stocks is far below the risks incurred, as they unquestionably are far more hazardous than the standard mines of Cornwall, Cardigan, Montgomeryshire, and other parts of Wales and the Isle of Man.

R. TREDDINICK.

Consulting Engineer.

3, Crown-court, Threadneedle-street, London, Jan. 31.

THE MINERS' WAGES MOVEMENT.

SIR.—There has been for the past few weeks a great stir about the miners' wages and the five-weeks months—some advocating the cause of the miners, whilst others have written and asserted naughty things of them, by saying it is only the lame and the lazy that have got up this agitation for redress; and I confess to a small feeling that that is the class who usually cry out first. Be that as it may, it appears, from the decision of the meeting held at Truro on Jan. 22, that they are to be paid in future thirteen times in the year. Notwithstanding this decision, I am disposed to think there is still a step further to go in order to give the industrious miner fair play. I am informed that in the collieries and in America, where many of our best men have emigrated in the last few years, wages generally rule higher; but there the miner has to work more hours, and in most cases much harder, than in Devon and Cornwall. From my experience, however, as a miner, I consider 8 hours per day quite sufficient for a man to work underground. I have taken the opportunity of conversing with men who have worked in different parts, as to whether the prices given in this country are not in most cases equal to what is given in others, and the inevitable reply is, Yes; but the great evil is we are not allowed to get the money we could, simply because of there being what is called an average of earnings in the two counties. The agents in the small mines, following the example of those in more extensive ones, all trying to make it appear that they are working their mines cheap, by keeping their monthly costs as near the average as possible.

This system is a bad one, and ought to be abolished at once and for ever, as it is calculated to make good men lazy, and only do work enough to earn a bare subsistence. That these are stern facts are too well known among our class. In the collieries the men ticket for their bargains for three months, and the law compels them to complete their contracts whether they earn little or much, the price per ton for raising the coals being the same throughout the mine. This system, as to the price, I am aware could not be adopted in our metalliferous mines. In America an agent or "boss" is generally underground with every shift of men, and he is held responsible for all the materials used, which in mines generally effect a great saving. Now, without being able to judge whether ticketing or boasting would suit us, I would say it is high time a different arrangement should be made in our setting. But the great difficulty seems to be in arriving at any arrangement which would be satisfactory to the agents and men. It might be advisable to adopt the plan advocated by "Miner," in the Supplement to last week's *Journal*, of changing the men from month to month in each other's bargains. But whether this would be generally acceptable or not remains to be proved. Some agents are held very high in their miners' estimation for their mode of setting—viz., of giving a month's stint without restriction, and a premium of 10*s.* or 20*s.* per fathom if a certain number of fathoms are driven in the month. I confess I never worked much in this way, but have been told that the premiums are very seldom earned. I suggested that the number of fathoms stipulated was too great to be accomplished in the time. The men said, "No; we could have driven the ground, but then the price would have been cut, and we should have had to work harder for less money in the coming month." I, however, said, "Suppose you were going to leave, or

0 NAME CHECK.

ing the material down. The hard work is wrought with the same class of tools, but with the addition of the hammer and wedge, implements with which vast amounts of the hardest ground in the older lime was broken away, but which are now to some extent superseded by gunpowder. In the older mines some really beautiful specimens of work with the pick may be seen, particularly in the limestone veins, and, although executed a great number of years ago, are still in excellent condition. The rock-salt is all that is seen in the rock-salt mines of the basin, where the rock-salt is all got by being broken away by the pick and wedge. A wedge is made of a description of pine called *steel*, from its

The introduction of not very long ago, of gunpowder into mining operations has, however, proved to be the greatest blessing that could have been bestowed upon the workmen, and principally because with the introduction of that powerful explosive it has been a so much more easy task to open out large excavations, and to enlarge the dimensions of levels and shafts. The result is that the passage of air is greatly facilitated, and the necessity is obviated for breathing apparatus and for the employment of artificial means of ventilation. When men were brought so close to the work of their tools, the practice of boring and blasting underground is comparatively of modern date. Gunpowder was invented in the 14th century, but it was not until 1610 that at Freiberg it was tried in mining, a step for which Martin Weigal has the credit. Many years after that—in 1670—it was introduced into the old Ecton Mine, in North Staffordshire, by some German miners; and even then it was long before it came into general use in this country, although it was regularly employed in the mines of Scotland and Ireland. It was not until the middle of the 18th century that it came into England, and at once effected a revolution in the quality and dimensions of mining work, though not in principle. With all its advantages in quickening and cheapening the work, it has latterly been seriously questioned whether in many mines gunpowder ought to be used at all. This has arisen from the serious accidents with which it has of late been credited. Again, its use is admissible when dealing with material which has to be got in large blocks, as, for instance, marble or building stone. The effect of gunpowder in mining is only to be done in the case of small pits, and with the aid of a small plant, division in the material that the mass will fall to pieces where it is not desired. And so in coal, even when the charges put in are very small, a much too large proportion of "smalls" is created. There are, too, certain operations in mining in which the use of gunpowder is also inadmissible. For instance, in the shafts it is often necessary to cut out niches in the sides on which timber beams are to be rested, and if this were to be done by powder under circumstances might be produced, which would be very dangerous. In the same way, in the case of the shafts, the traps. Niches of this kind, therefore, where weight has to be supported, must be put out solely by the pick and wedge. The mode of using gunpowder is ex-

The total original fund of the field he estimated at \$31,810,000 tons, of which 96,285,000 tons had been gotten, and 136,585,000 tons remained. He estimated that the town would require 100,000 tons of coal annually, and, assuming this rate of get to continue, and he did not think it would be increased, the quantity of coal remaining would last a period of about 52 years. This exhaustion would, however, be a gradual process, and its effect upon the town would be produced slowly and almost imperceptibly. The number of colliers employed in the town would be about 1000, and they would be about one-third the total, with surfacemen, of about 7000, earning something like 90000. per week, and the withdrawal of this from the town must have a depreciating effect upon the place generally. There was, however, one hopeful prospect before the town, at least so long as the coal period continued, and that was the rapid improvement of the town, and the consequent increase of the population, and the increase of the town; and it was to be hoped that when the time came that the local coal supply was exhausted, some other local source of wealth might be discovered.

"**FAULTS.**"—At a meeting of the Manchester Geological Society, held on Tuesday, in the Museum of Natural History (Mr. John Knowles, President, in the chair), Mr. T. Livesey read a paper on "The origin of faults, and the evidence afforded by the rocks of the district of Manchester, as regards the occurrence of faults, and of 'up-throws' and 'down-throws.' " In his opinion these descriptions were incorrect so far as the former were concerned, there being no such thing as an "up throw," faults being in reality all "down-throws." With regard to the origin of faults, his investigation had made on the subject just led him to the conclusion that they took place when the strata in which they were found were in a state of

running thereon. The water-mill works very satisfactorily, the usual rains and snow storms, and have now water enough to run 100 stampers, and he thinks they will have all through the new year.

CLIFTON.—C. S. Richardson, Jan. 20 : This morning

to run up a rise to surface for ventilation
CLIFTON.—C. S. Richardson, Jan. 20: This morning
my examination of your property, with a view to furnishing
as per agreement; my severe illness has precluded my doing
main shaft, called No. 1, is such that I estimate will yield
about 25 per cent. of this is of which I estimate, the remainder
class; it is certainly the finest course of ore of any mine in
Shaft: The leading vein here may be called 1 ft. thick, but
for I am not at present prepared to state the average yield—
quite enough to make it a paying lode; the ore here is richer
No. 1 shaft. As no reliable assays have yet been made, I can
value; I should, however, guess it from 80 to 140 ozs.; it is

BIRDSEYE CREEK (Gold).—Telegram from the superintendent, J. A. Stone dated February 1:—"We have cleaned up Stream after a run of 27 days, and obtained a profit of \$100. We have cleaned up Sam after a run of 35 days. The gross returns are \$600; the net send you a remittance of \$500."

MAR AND TIRITO.—The directors have much to announce the arrival, per Royal Mail steamer Tagus, of 4 tons concentrated black ore, and 1 ton 18 cwts. 3 qrs. of argentiferous metal). This parcel has been carefully assayed, and sold at \$847.16s. per ton; black ore, 590.15s. 6d. per ton; making a total of three further shipments of ore are also to hand, viz., brig, No Name, 12 bags Petaque, and 253 bags of black ore, 15.7 cwts. estimated respectively at 207. per ton; and per brig No 11 cwt. 3½ qrs. of concentrated black ore, e-timated at 400. per ton.

UNITED MEXICAN.—Mr Edward Hay, dated Guadalupe Mine of Jesus Maria y Jose: The several workings in this mine sufficient ore for the wants of the haciendas, which are giving rise to the sale of the same. The principal vein is obtained from San Cristobal and Asencion. The profit for the quarter closed March 31st, 1880, compared with the corresponding quarter of San Cayetano. In the frente of the adit in the Buenos Aires continues hard. In the last fortnight several relices (walls) of been cut, all "contra natural." In the cross-cut opened to blast the lode continues very hard, and this, added to the great fuel materially impeded our advance in that quarter. We have now commenced another shaft, and it is hoped will be successful. It has augmented so much that it is running out freely by the side. Although no silver has yet been found, the general appearance promising, and this interesting work shall be pushed on as fast as is of great importance to reach the other wall of the lode.—Miner de la Ovejera. In the end of Santa Elodia the rock continues

KANSAS.—Telegram: Profit for January, \$5000. The down 2 fathoms since last reported. Still looking well.

MALAGA.—S. R. Cocks, Jan. 19: We are making good the mines. The intersection of the lodes by the deep adit level open out large bodies of ore. We have four different sets of veins, lead, galena, zinc, and silver. The rich silver lead ore is the character as the best of imples sent this week. Indeed, our most splendid, lead ore very rich and solid having been brought down from the deepest point in the mine on the lode; it is the finest I have seen in the mine, which is very cherting, as the bottom adit referred to—will be home to intersect, and come under the lode. We have the dwelling houses completed and furnished, residing in them, and the office, smithy, and yard are completed. We will start the dredge in a few days, as far as possible. I shall now ready for shipment by the steamer.

report, Dec. 19: After a silence of two months I again ad-
 vanced. I have been seriously sick, and am still quite weak, but hope
 my entire health and strength. I visited the mine when I found
 that the water was still at the last level. I again went to the
 with the intention of making an examination of the mine, and
 dets, and everything pertaining to the same. I made a partial ex-
 amining to my illness, and the fact that it rained the most of the
 past three days, it was not as thorough as I expected it to be.
 enough to satisfy me that the mine is a "big one," and I
 expected the gravel from about 50 ft. of the surface down to the
 the surface; I got fair prospects in all, and good prospects in
 all. How deep the deposit is I do not know; so far as I could
 of a bed-rock, and I do not think it has ever been worked
 workings. Of outlets there are plenty, and good ones, but they
 are not so numerous as I expected. I will be more difficult to open
 been touched. I went up the ditch and examined that, and
 caused: I found the ditch in many places in very bad condition.
 slips, caused by recent heavy and unprecedented rain. Old residents
 never saw anything like it before; I measured the water some
 stream, and found it at least 1200 in. The natives informed me
 as it always contained at least half the present quantity; the
 water supply is quite ample. I am also informed that a
 ditch would tap another branch of the River Suco, which would
 as much water again as the present supply. I have nearly all
 the mine, and everything is progressing as fast as can be expected
 the mine, and everything is long. I am not at all discouraged, but
 coated, but hope when it is open the result will amply repay me
 having to wait. I feel confident they have a very rich mine, and
 be worked to great advantage.

LUTSIANIAN.—Jen. 23: Palhal: The men in Taylor's shaft have been engaged during the last fortnight in cutting out a large quantity of quartz, and the 160 fm. level of the shaft: In the 180, east of Taylor's shaft, the lode is 7 feet wide, quartz and country, with strings of carbonate of lime and siliceous shale, the same level west the lode yields 1 ton of ore per fathom; this also against the winze skulking below the 140, where the lode yields 1 ton per fathom. In the 140 east the lode has increased in width and becomes unproductive. In the 140 west the lode is 4 feet wide, a branch of ore, worth 1 ton per fathom. The lode is 4 feet wide, composed of quartz and schisto, 6 feet wide, and is made up of quartz, spotted with iron ore, on a level, east of this shaft, are still unproductive. The lode of Perez's shaft, is now 4 inches wide, with good stones of only 1 in. 8, is of the same size and character as last reported, and mark applies to the branch in the 38, west of the Slide lode. In the west and north-east of the Taylor's shaft, the Slide lode is composed of flooken and schisto.—Rise and Winzes: The lode in the 180, east of Taylor's shaft, is 4 feet wide, and is below the 140, down to meet it, the lode is 4 ft. wide, composed of quartz and schisto. In the 140, west of Taylor's, on Basto's lode, the winze No. 90, below the 140, west of Taylor's, on Basto's lode, yields 1½ ton of ore per fathom; and in No. 91, below the same level, the lode is yielding 3 tons per fathom.—Carvalho: A new place in the 60 cross cut, north of Incline shaft.—Levels on Incline shaft: No. 80, east of Incline shaft, the lode is 1 foot wide, composed of quartz and schisto, yielding stones of lead: In the 30, 2½ ft. wide, composed of quartz and schisto, yielding stones of lead: In the 20, 2½ ft. wide, composed of quartz and schisto, yielding stones of lead: The 40 m. level is being driven west on lode 1½ foot wide, composed of quartz and schisto, yielding stones of lead.—Caunter Level: At the adit, west of Incline shaft, was a level on the course of schisto and flooken. In search of the lode, we went up the back of the 10, on a lode 1½ foot wide, spotted with iron ore, in the 20, west of Incline shaft, the lode is 5 feet wide, composed of quartz and schisto, yielding stones of lead and blende, and runners of cony in the middle.

The west thilode is 3 feet wide, worth $\frac{1}{2}$ ton of lead per fathom. **WEST CANADA.**—Dec. 21: Wellington: The two bottom of the 4th, east of Rowe's shaft, continue to yield 2½ tons per fathom. In the bottom of the 35, east of Bray's shaft, the stopes give 2½ tons per fathom. Huron Copper Bay: In the 60 m. level, east of Palmer's shaft, the thilode is 2½ feet wide, and will yield 1½ ton per fathom. Since the date of our last report in the cross cut driving west of Palmer's shaft. In the stope below the 30 m. level, the thilode is producing 2½ tons per fathom; and in the stope below the 20 m. level, the thilode is producing 3 tons per fathom. In the bottom of the 35, east of Palmer's shaft, yields 2½ tons per fathom. On the Fire hole, the bottom of the 35, the stope gives 2½ tons per fathom. The bottom of the 20, east of the new engine house, is yielding 2 tons per fathom.

ECLIPSE (Gold).—A special meeting of this company will be held on Wednesday, when a resolution will be submitted to the shareholders increasing the capital of the company to the extent of £500,000, 10,000 shares of the nominal value of 1l. each, with such privileges and restrictions to be attached thereto as the meeting may think proper.

ENGINE GOVERNORS.—The object of the invention of **DEKENS**, of Paris, is to afford a simple and certain means for automatically governing the speed of an engine, and to permit of two or more arrangements based on the same principle. He calls the device an automatic compensator; and the second an inverse automatic compensator. In the first arrangement, a screw, and nut, arranged in combination with the governor. The nut, which has a tooth or number of teeth. So long as the engine runs at its normal speed, the tooth of the nut will remain midway between the engine, and the governor. As the speed increases, the tooth of the nut will disengage the tooth of the nut will come in contact with the governor, and the balls will either rise or fall, thus closing or opening the throttle valve. In the second arrangement he employs two balls, each with a single pinion in opposite directions. Each wheel has a pinion on it, and what actuates the throttle valve. A screw will be provided with a nut, strong enough to hold the two wheels. This ring will be on a nut, at normal speed, lies between the two wheels; when the ring engages with one or other of the wheels, and the nut is lowered,

ECLIPSE.—Mr. Henry Tregellas reports under date Jan. 2, the yield of gold from the stamps for the second division of December, is \$1,359. This has been derived from 250 tons of the quartz that lay at the mine at the big dip. He anticipated a better yield, and they would have had, had they been able to treat more fully the tailings and concentrated sand. From one grinding pan they obtained, in twelve days, \$470. They are filling up the remainder of the pans (4), when they will get better results. They have on hand near 30 tons of concentrated tailings, which assay over \$20 per ton. When they treat the pans running, there will be no accumulation of tailings. Operations on the cross-course will be commenced in a few days. The sinking of Haymen's shaft, which is now down 45 feet below the 800 feet level. The lode is 7 ft. wide but during the sinking of the last 30 feet the lode has been poor. It must be borne in mind that Haymen's shaft is sunk by the side of a cross-course over 100 feet wide, consequently the lode in said shaft has often been disordered by the influence of the cross course, which is the case with the lode in Haymen's shaft at this time; but from appearances, he believes they will soon get a change for the better. Since last report they have opened the track as far as completed to within 2000 feet of the foot of mountain, and they have 17 one-ton cars

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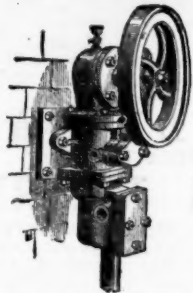
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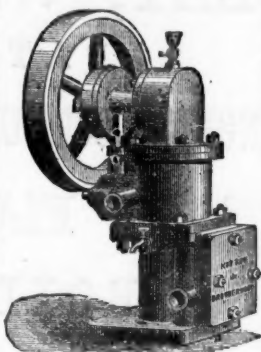
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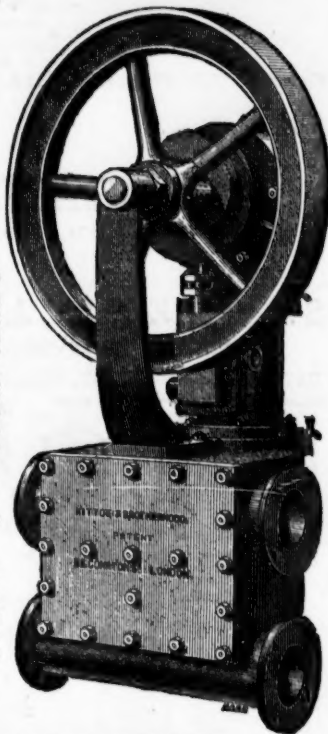
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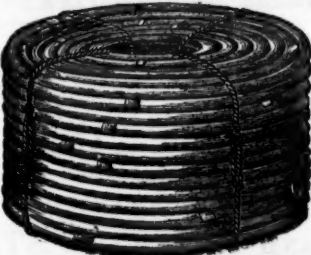
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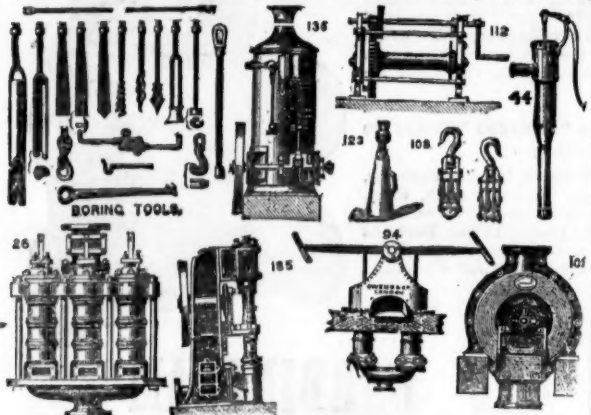
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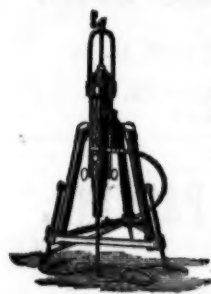
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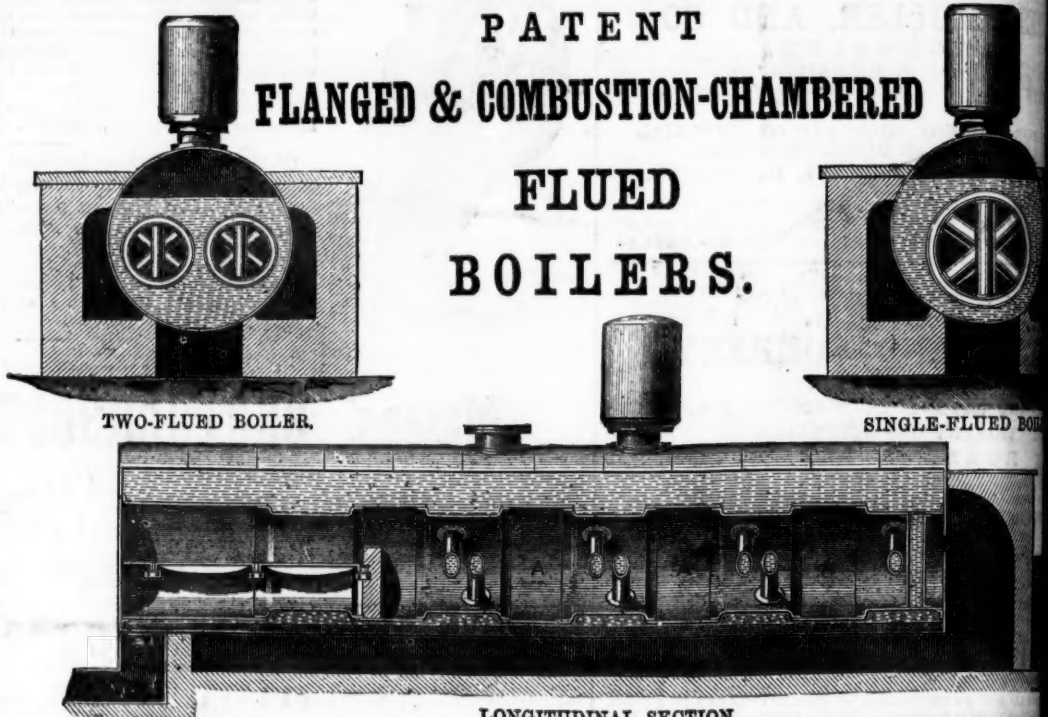
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